



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/775,731

02/09/2004

Tung-Shuan Cheng

TSMC2003-1129(N1280-00350

1527

7590

02/23/2005

Howard Chen  
Duane Morris LLP  
Suite 2000  
1 Market, Spear Tower  
San Francisco, CA 94105-1104

EXAMINER

ZWEIZIG, JEFFERY SHAWN

ART UNIT

PAPER NUMBER

2816

DATE MAILED: 02/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/775,731

Applicant(s)

CHENG ET AL.

Examiner

Jeffrey S. Zweizig

Art Unit

2816

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 February 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

***Drawings***

1. Figs. 4A-4C and 5A-5C (described as "typical") should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Objections***

2. It would appear that claim 16 should depend from claim 12, not claim 1.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-20 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. Elements critical or essential to the practice of the

invention, but not included in the claims is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

Claim 1 recites a digital to analog converter coupled to the oscillator for generating one or more analog signals of predetermined voltage level based on the pumping signal as configured by a set of inputs thereof; and a charge pump coupled to the DAC for producing a dc output based on the analog signals.

The disclosure does not properly enable one of ordinary skill in the art to understand how one or more analog signals of predetermined voltage level are generated or how a dc output based on those analog signals is generated. Insofar as understood, the analog signals are directed toward the output of DAC 306 (Fig. 4A) or the input to charge pump 310 (Fig. 5A). The DAC disclosed in Fig. 4A does not show an output, however, the output is presumably the common node of the three capacitors. Fig. 4C appears to show a varying voltage output. This in itself is not understood as the circuit shown in Fig. 4A appears to be configured to provide a varying charge output, not a varying voltage output. It is not seen how the output voltage would vary as the pull up transistors are all connected to the same Vcc. In any event, the DAC shows only one output whereas the charge pump requires two inputs CLK & CLKB. One of ordinary skill in the art could generate CLKB from CLK with a simple inverter, however, as pointed out above, the DAC appears to produce a varying charge output, not a varying voltage output. A mere inverter would not effectively transmit such a charge transfer. Since the specification is silent as to exactly how the circuit shown in Fig. 4A would

interface with the circuit shown in Fig. 5A and since the two circuits appear to be incompatible, the nature of the claimed analog signals cannot be understood.

The disclosure does not properly enable one of ordinary skill in the art to understand how the pumping signal is to be configured by a set of inputs. Insofar as understood, the pumping signal is directed toward the output of oscillator 302 and the set of inputs is directed toward the input to code converter 308. The specification ambiguously describes the output of code converter 308 as a set of finely-divided thermometer signals. No further definition is provided. Thus the nature of the signals 316 is unknown. Control module 304 combines the pump signal and signals 316 to provide outputs to DAC 306. However, the specification provides no explanation as to the nature of module 304's construction or function. The specification is also silent as to the nature of the signals output from module 304. Thus the nature of the signals output from module 304 is unknown. The specification indicates that components 304, 306 and 316 may be combined into a single unit as shown, for example, as 702 in Fig. 7A, however, such a DAC would be quite unconventional. The inner working of such a device cannot be dismissed without further explanation. As best understood, an object of the present invention is to selectively modify the amplitude of a square wave in discrete increments. Describing such a circuit as a digital to analog converter is questionable. Thus, it is not known how the pump signal is configured by a set of inputs.

It is not clear toward what the "one of more outputs" recited in claim 1 line 8 is directed. As pointed out in claim 1 line 7 and disclosed by the specification, the

invention has exactly one output Vout (i.e. the direct current output). There appears to be no support for the "one or more outputs".

Claim 1 and dependent claims 2-11 are not properly enabled.

Claim 12 has the same problems. Additionally, it is not clear toward what the "one of more substrate bias voltages" recited in claim 12 line 1 is directed. As pointed out in claim 12 line 8 and disclosed by the specification, the invention has exactly one output Vout (i.e. the direct current output). There appears to be no support for the "one or more substrate bias voltages".

Claim 12 and dependent claims 13-16 are not properly enabled.

Claims 17-20 have the same problems and are not properly enabled.

Additionally, claim 11 recited a voltage doubler. No voltage doubler has been disclosed. As best understood, the "voltage doubler" is directed toward component 704 shown in Fig. 7A. As shown in Fig. 7D, the voltage is not doubled. The output voltage from 704 is not doubled, but is the sum of a varying input voltage and a fixed voltage Vdd. Claim 11 is not properly enabled.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 4, 5, 10 & 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Chow (6,002,599).

As best understood, Fig. 5 discloses an oscillator (inherent) for generating a square pump signal within a predetermined operating voltage CLK, analog signals o1 & o2, a set of inputs Vin & Vref, and a charge pump 32 with a dc output Vpp as recited in claims 1, 4 & 5. As best understood, the recited DAC is directed toward a circuit for modifying the amplitude of the pump signal. Fig. 5 discloses a "DAC" 31 that functions as recited in claim 1.

The DAC has a predetermined number of inputs (2) based on a predetermined number of steps (1) as recited in claim 10.

As best understood, the output from the "voltage doubler" 32 is the sum of the input and supply voltages as recited in claim 11.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chow in view of Katsuhisa (USPN 6,762,640).

Chow does not appear to disclose a load capacitor as recited in claim 2. However, charge pumps with load capacitors are common in the art. Katsuhisa Fig. 3 shows an example load capacitor C0. It would have been obvious to one of ordinary skill in the art at the time of the invention to add a load capacitor to Chow as taught by Katsuhisa for the benefit of filtering the output voltage from the charge pump. Claim 2 is obvious.

9. Claims 3, 6, 12, 14, 16, 17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chow in view of Komiya et al. (USPN 6,714,065).

Chow does not appear to disclose a ring oscillator as recited in claim 3. However, charge pumps with ring oscillators are common in the art. Komiya et al. Fig. 5 shows an example ring oscillator 101. It would have been obvious to one of ordinary skill in the art at the time of the invention to add a ring oscillator to Chow as taught by Komiya et al. for the benefit of providing the pump signal CLK. Claim 3 is obvious.

Chow does not disclose a negative charge pump for substrate biasing as recited in claim 6. As pointed out in Applicants' background of the invention, the application of negative voltages to substrates is known. Further, it is commonly known that a charge pump's output polarity may be reversed merely by reversing the polarities of the charge pump's transistors and supply voltages. Komiya et al. Figs. 2A, 2B and 3-8 show examples of this procedure. It would have been obvious to one of ordinary skill in the art at the time of the invention to reverse the polarity of Chow's output as taught by



Komiya et al. for the benefit of providing negative voltage to bias a substrate and prevent device leakage. Claim 6 is obvious.

Claims 12, 14, 16 and 17 are obvious for the reasons above.

Chow and Komiya et al. do not appear to specify voltages as recited in claim 20, However, those of ordinary skill in the art are intuitively motivated to optimize their circuits for best performance. It would have been obvious to one of ordinary skill in the art at the time of the invention to select a desired bias voltage for the benefit of optimizing leakage current. Claim 20 is obvious.



10. Claims 13 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chow in view of Komiya et al. and Katsuhisa.

As per the reasons above, it would have been obvious to add a load capacitor as taught by Katsuhisa to the combination of Chow and Komiya et al. Claims 13 and 18 are obvious.

### ***Conclusion***


11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey S. Zweizig whose telephone number is (571) 272-1758. The examiner can normally be reached on Monday thru Thursday 6:00 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy P. Callahan can be reached on (571) 272-1740. The fax phone

Art Unit: 2816

number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Jeffrey S. Zweizig  
Primary Examiner  
Art Unit 2816

JZ